

REMARKS/ARGUMENTS

Favorable reconsideration of this application is respectfully requested in view of the above amendments and the following remarks.

Claims 53-68 are pending in this application. By this Amendment, Claims 1-52 have been canceled and Claims 53-68 have been added. It is respectfully submitted that no new matter has been added.

In the outstanding Office Action, Claims 1-3, 5, 9, 10, 15, 17-22, 27-30, 32-36, 38-44, 46, 47, and 52 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Oesterle et al. (U.S. 5,656,140, hereinafter “Oesterle”). Claim 4 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Oesterle as applied to Claim 1, and further in view of Goto (U.S. 5,958,213); Claims 6, 7, 11-14, 16, 23-26, 31, 48, and 49 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Oesterle as applied to Claims 1, 15, 22, 30, and 34 above, and further in view of Beer et al. (U.S. 4,670,114, hereinafter “Beer”); Claims 8, 44, and 45 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Oesterle and Beer as applied to Claims 7 and 34 above, and further in view of Thompson III et al. (U.S. 5,873,986, hereinafter “Thompson”); Claims 9, 10, 13 and 21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Oesterle as applied to Claims 1 and 15 above, and further in view of Pushpavanam et al. (U.S. 2005/0167285, hereinafter “Pushpavanam”); and Claims 11, 50 and 51 were rejected under 35 U.S.C. § 103(a) as being unpatentable Oesterle and Pushpavanam as applied to Claims 9 and 34 above, and further in view of Gasser (U.S. 6,387,243).

It is noted that the Office Action refers to Goto in the rejection of Claim 4 on page 13 thereof. However, Goto has not been listed on the Notice of References Cited PTO-892. It is respectfully requested that Goto be listed on a PTO-892 in the next Official communication.

Oesterle describes a method of remediating metallic contaminants from a substance, such as contaminated earth, by first mixing the substance with water and acid in a container to form a mixture. The container has a cathode side and an anode side partitioned using a membrane.

However, Oesterle describes “allows intimate contact of the mixture with the anode” (column 2, lines 42-43). Oesterle also describes “the mixture would be poured inside the ion permeable membrane and circulated against the anodes so as to provide substantial contact between the mixture and the anodes” (column 8, lines 39-42).

Namely, Oesterle requires always a contact of the mixture and the anode. On the other hand, the present invention in new Claim 53 recites “into the cathode zone, the solid materials, water and an acidic substance or an alkaline substance are introduced” (the last two lines of new Claim 53). The present invention requires contact of contaminated materials with the cathode but not anode.

This construction of Oesterle is the same as Japanese patent application laid-open No. 1999-253925. Such an arrangement is disadvantageous as described in the specification, paragraph [0004]. Namely, since the cathode and the mixture are separated by the membrane, the interstitial water flows from the anode side to the cathode side through the membrane, and the mixture is not reduced by the reduction potential of the cathode, but conversely, the mixture is highly likely to be maintained in an oxidizing atmosphere by the oxidation potential of the anode. Thus, the fractions of solid deposits, such as lead, cadmium, and mercury, taking sparingly soluble adhesion forms, called an iron-manganese bound form and an organic matter-bound form cannot be extracted efficiently, and the heavy metal contents in the soil cannot be fully lowered.

As mentioned in the specification, paragraph [0016], heavy metals are present in an exchangeable form, a carbonate bound form, an iron-manganese bound form, or an organic

matte-bound form, in the solid contaminated material. Among these forms, the heavy metals present in the exchangeable form enter a corrosion region under strongly acidic or strongly alkaline atmosphere, and their water dissolution concentrations are increased. On the other hand, the heavy metals in the carbonate bound form, the iron-manganese bound form, and the organic matte-bound form have low solubility even in a strongly acidic or strongly alkaline atmosphere, and they are difficult to dissolve. When the heavy metals present in such sparingly soluble forms are further subjected to a reducing atmosphere, they can be transferred into a corrosion region, and their solubility in water can be increased.

According to the present invention, as mentioned in the specification, paragraph [0017], the diaphragm is located between the cathode supplied with a reduction potential and the anode to separate the cathode zone containing the cathode from the anode zone containing the anode. The contaminated solid material is supplied to the cathode zone, and brought into contact with the cathode, but not brought into contact with the anode. In this condition, the heavy metals-contaminated solid material can be maintained in a reducing atmosphere (namely, no oxidizing compounds). The present invention comprising the above constructions can remove the heavy metals present in the sparingly soluble forms.

The other citations do not correct the deficiencies of Oesterle.

Goto describes water treatment using an electrolyzer with an anode and a cathode. Goto does not describe a reaction vessel comprising an anode zone and a cathode zone defining a diaphragm between an anode and a cathode and a device configured to supply solid materials contaminated with heavy metals into a cathode zone.

Beer describes that a solution of metal salt is introduced into the cell compartment to form colloidal particles on the surface of an electrode. Beer does not describe a reaction vessel comprising an anode zone and a cathode zone defining a diaphragm between an anode

and a cathode and a device configured to supply solid materials contaminated with heavy metals into the cathode zone.

Gasser describes a method for separating metal ions absorbed on a resin using an eluting agent. Gasser does not describe a reaction vessel comprising an anode zone and a cathode zone defining a diaphragm between an anode and a cathode and a device configured to supply solid materials contaminated with heavy metals into the cathode zone.

Thompson discloses an apparatus for recovery of silver from photographic chemicals, especially bleach-fix solutions. Thompson does not describe a reaction vessel comprising an anode zone and a cathode zone defining a diaphragm between an anode and a cathode and a device configured to supply solid materials contaminated with heavy metals into the cathode zone.

Pushpavanam discloses an electrochemical method for the removal of arsenate from drinking water, wherein the arsenate is removed by adsorption of metal hydroxide, formed by 'in-situ' anodic oxidation. Pushpavanam does not describe a reaction vessel comprising an anode zone and a cathode zone defining a diaphragm between an anode and a cathode and a device configured to supply solid materials contaminated with heavy metals into the cathode zone.

Therefore, the present invention of Claim 53 is not rendered obvious over Oesterle, Goto, Beer, Gasser, and Pushpavanam or any combination thereof.

Claims 54-68 depend on Claim 53. Thus, all of Claims 54-68 are patentable for the reasons argued above.

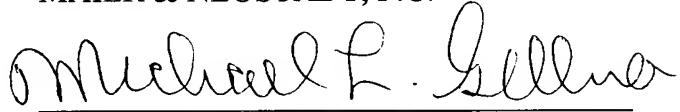
Accordingly, it is respectfully requested that Claims 53-68 be passed to allowance.

Consequently, for the reasons discussed in detail above, no further issues are believed to be outstanding in the present application and the present application is believed to be condition for formal allowance. Therefore, a Notice of Allowance is earnestly solicited.

Should the Examiner deem that any further action is necessary to place this application in even better form for allowance, the Examiner is encouraged to contact the undersigned representative at the below-listed telephone number.

Respectfully submitted,

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